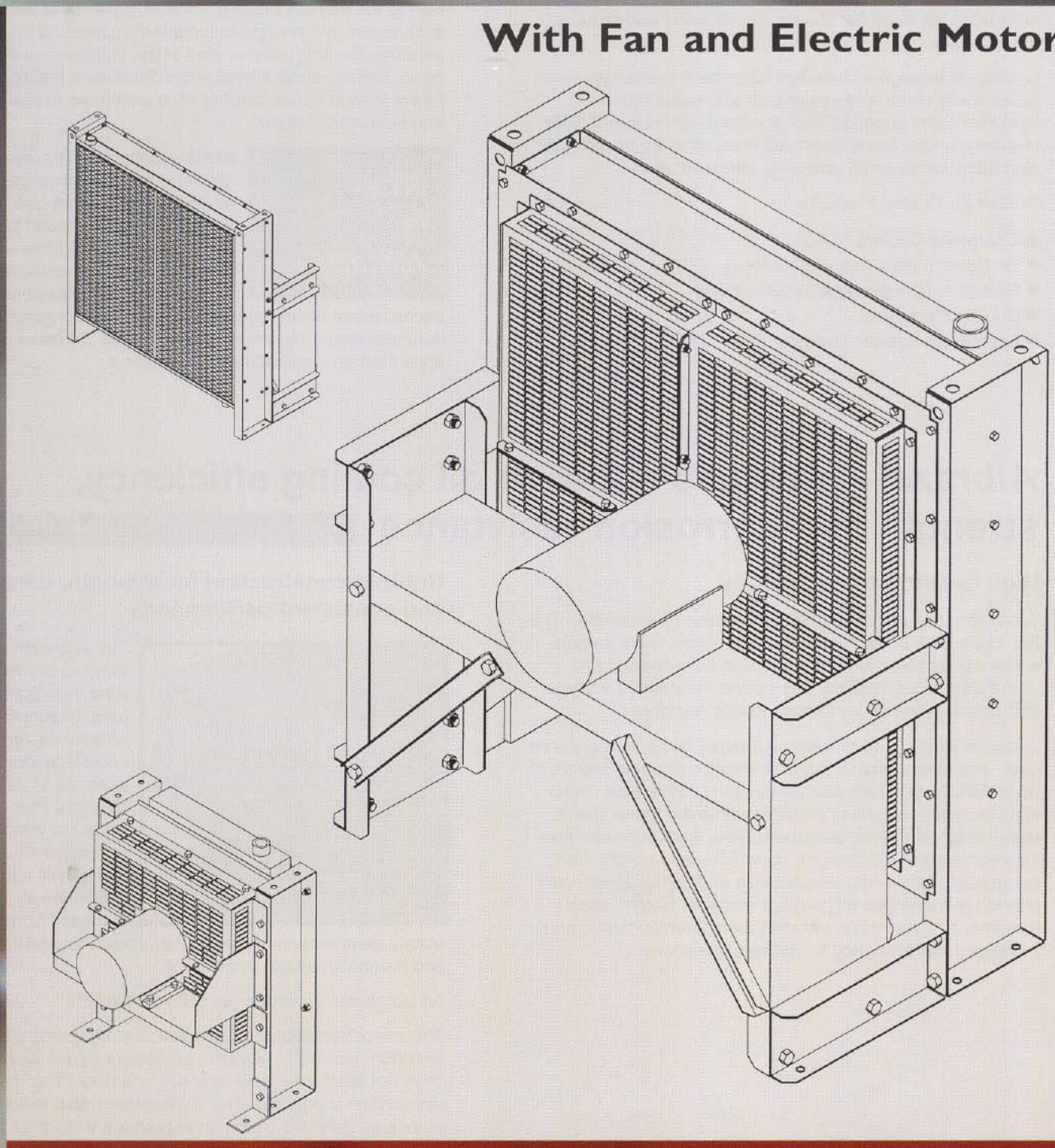
rocore standard industrial oil coolers

Standard *Albraze*®+ Oil Coolers

With Fan and Electric Motor



ROCORE

Standard Industrial *Albraze*®+ all-aluminum oil coolers

Why Air Cooling

Air cooling has several advantages over water cooling in many applications. Where cooling water supplies are scarce, unreliable, inconvenient, or costly to provide, cooling with air is favored. When engine jacket water temperatures are higher than desired oil temperatures, air cooling is used to achieve desired oil heat dissipation rates. Air cooling eliminates the need for anti-freeze solutions and reduces maintenance.

Cycling oil through a closed oil-to-air heat exchanger eliminates costly water and sewer charges, water treatment equipment and supplies, and downtime for heat exchanger cleaning. Under some circumstances, oil-to-air cooling will also allow for lower oil operating temperatures.

Rocore Air Cooled Products

- Charge Air Coolers (CAC)
- Oil Coolers (with and without fans)
- Radiators (Copperbrass or Aluminum)
- Cooling Packages
- Application Specific Designs

What Is Albraze®

Albraze is the Rocore trade name applied to the process Rocore utilizes in the manufacture of its brazed aluminum heat exchangers. This process makes possible highly efficient all-aluminum oil coolers that are compact, durable and corrosion-resistant.

During the Albraze brazing process, assembled heat exchangers are brought to a carefully controlled high temperature. Brazing alloy — clad to the surface — melts and flows, forming a metallurgical bond between mating parts. Fillets formed by the brazing alloy as it flows are shaped and help resist fatigue.

What Is *Albraze*®+

Albraze is the new Rocore trade name for the Albraze product line. All Albraze oil coolers now feature Rocore's most advanced brazing and coating technologies which add longer life to cooler surfaces. Using CASS (ASTM B368) salt and chemical test environments, the ***Albraze+*** cores have demonstrated a minimum of 500% more corrosion resistance than previous Albraze® oil coolers.

Albraze®+ provides superior oil cooling efficiency, strength and corrosion resistance

High heat-transfer efficiency

Tubes and fins are designed to maximize heat transfer. The flat, low profile of the tube exterior provides more surface exposure with less air-side restriction than comparable round-tube types. Internal fins extend the primary surface and turbulate the oil for increased heat transfer.

Because they are so efficient, ***Albraze+*** oil coolers are compact, and able to match the performance of other coolers of up to 50% larger. This permits designers to reduce cooler size, or increase cooling capacity within the same space required by other less efficient coolers. And aluminum construction means light weight, up to 25% less weight than comparable size units. Smaller size and lighter weight can provide reduced overall package size and weight, easier handling and assembly, reduced transportation costs, and increased fuel efficiency in mobile applications.

Unitized construction for strength, durability, and consistent performance

The ***Albraze+*** bonding process joins individual fins, tube, headers, and turbulators into a one-piece integral structure of superior strength. Brazed joints are equal to or exceed the strength of the parent metal. The ***Albraze+*** bond resists deterioration from vibration, shock, torsional stress, and thermal/pressure cycling.

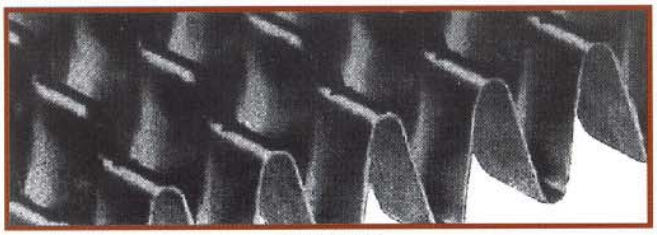
All-aluminum, corrosion-resistant for long life

The corrosion-resistant properties of aluminum are another important feature of Albraze+ oil coolers. Since aluminum does not react adversely with oils, "oil varnishing" caused by deoxidation is avoided. The all-aluminum core is not subject to exterior galvanic corrosion associated with cores having dissimilar tube and fin materials. For increased protection, each Albraze oil cooler is thoroughly cleaned and given a multi-step finish of corrosion-resistant surface treatments and then powder painted for a drip/run free surface appearance

Core designs feature all-aluminum *Albraze*®+ construction with ruffled serpentine turbulated anti-clog fins or higher efficiency louvered fins.

Anti-clog cores featuring ruffled-fin design

Turbulent air flow and generous fin spacing permit free pass-through of most airborne dust and debris. Costly downtime associated with frequent cleaning of closely spaced plate fin competitive coolers, can be drastically reduced or eliminated with Rocore Albraze+ oil coolers by using the ruffled fin design.

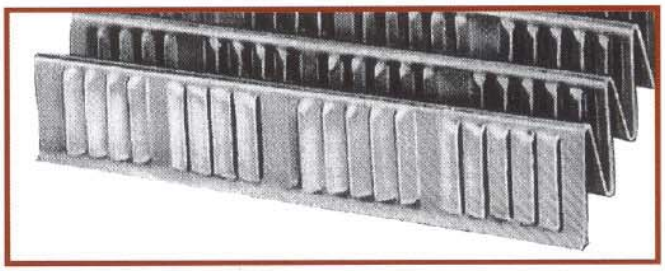


Ruffled Fin

High efficiency louvered fin design

Louvered surface serpentine-type fins are available in the construction of ***Albraze+*** oil coolers to deliver high-performance cooling power. Compared to other fin types the design of the louvered fin provides greater agitation of the air through the core and promotes increased wiping action of the cooling air against the hot oil tube surfaces. The result of this greater air turbulence is a higher air side heat-transfer coefficient and, therefore, a greater heat-transfer rate.

The highly efficient fin design contributes to the smaller overall size and lighter weight of the ***Albraze+*** oil coolers while providing the same cooling capacity as much larger size coolers.



Louvered Fin

Turbulated tubes increase heat-transfer rate

Extruded tubes are lightweight, seamless and have increased material at the tube edges for greater impact and abrasion resistance. Internal fins increase primary heat-transfer surface and turbulate the oil, thereby reducing boundary layer formation and increasing the rate of the heat transfer.

Tube Assembly

During the Albraze process, the turbulators are brazed to the inside of the oil tubes and become an integral part of the tube thereby increasing the structural strength and pressure handling capability.

Design and performance

- Self-supporting base
- Lifting holes for easier handling during installation
- Hydraulic and D.C. Motors available on selected models
- Cores are rated at 150 PSI/300°F max. working pressure and temperature
- Totally enclosed motors
- Core available for air-cooling application and low pressure drops

Design flexibility permits modification to accommodate a variety of applications

Air-to-air cooling. Where specification requires air to approximate ambient conditions and low air pressure drops, such as in compressor cooling, air aftercooling with air can be accomplished easily and economically through the use of Rocore standard cooling sections. Refer to Catalog.

2-circuit oil/air aftercooling. The use of standard components for compressor oil cooling and air aftercooling can result in a practical and economical method to accommodate this dual-cooling requirement. Refer to Catalog

2-circuit cooling. Where two separate oil-cooling circuits and required, cooling system design conditions may permit the use of standard components to economically accomplish the dual-cooling application.

Large volume oil cooling. Two standard Rocore cooling sections can be arranged in parallel to handle large volume oil flow while maintaining low oil pressure drops. Consult Rocore for additional information.

Replacement of existing water-cooled units. Where feed water supplies are costly, unavailable, or unreliable, fan-equipped oil-to-air coolers can be used in lieu of water-cooled units or as replacements for them.

Selection procedure/performance data — AB (ruffled-fin core) and LAB (louvered-fin core) models

Example

Select a cooler to remove 50 HP of heat from 25 GPM of SAE 10 oil. Maximum allowable temperature in the system (at inlet to cooler) is 150ºF. Maximum ambient air temperature is 85ºF. Maximum allowable pressure drop is 20 psi.

Step 1.

Determine Q (heat rejection in BTU/min) for design conditions.

$$Q = 50 \text{ HP} \times 42.44 \frac{\text{BTU/min}}{\text{HP}} = 2122 \text{ BTU/min}$$

Step 2.

Determine Entering Temperature Difference (E.T.D.)

T_o = temperature of oil entering cooler = 150ºF

T_a = temperature of air entering cooler = 85ºF

E.T.D. = $T_o - T_a$ = 150ºF – 85ºF = 65ºF

Step 3.

Calculate Q'

$$Q' = Q/\text{E.T.D.} = (2122 \text{ BTU/min})/65ºF = 32.6 \frac{\text{BTU/min}}{ºF \text{ (E.T.D.)}}$$

Step 4.

Enter curve 1 at flow rate of 25 GPM and read up to intersection of 32.6 $\frac{\text{BTU/min}}{ºF \text{ (E.T.D.)}}$

Select cooler whose performance curve lies above this point (LAB-132 or AB-132).

Step 5.

Calculate pressure drop.

$\Delta T = Q/(f \times K)$

Where: ΔT = temperature difference between oil entering and leaving the cooler (ºF)

f = oil flowrate (GPM)

K = 3.5 (constant for oil)

$$\Delta T \text{ (oil)} = \frac{Q}{f \times K} = \frac{2122 \text{ BTU/min}}{25 \text{ GPM} \times 3.5} \quad 24.3ºF. \text{ Use } 24ºF$$

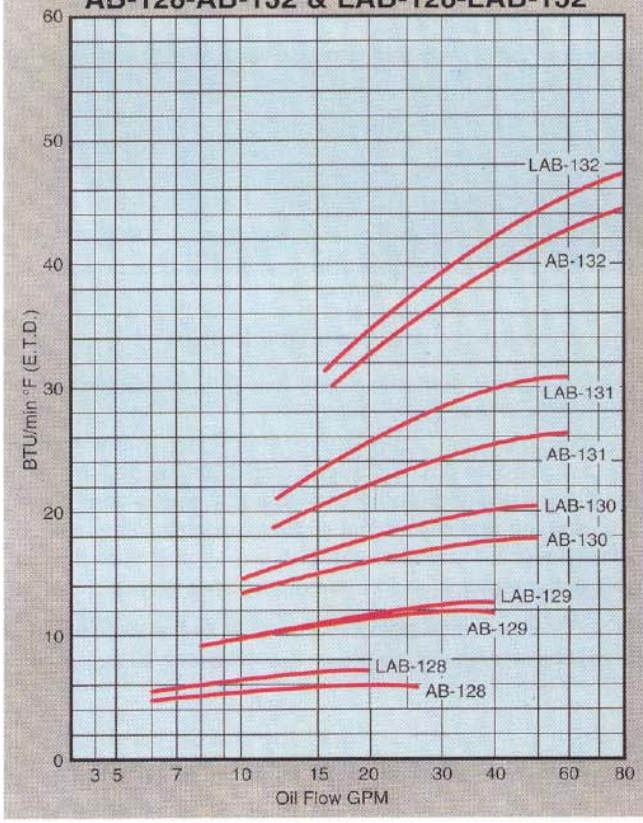
T_{avg} = average oil temperature in cooler = $T_o - 1/2\ \Delta T$

T_{avg} = 150ºF — 1/2 (24ºF) = 138ºF

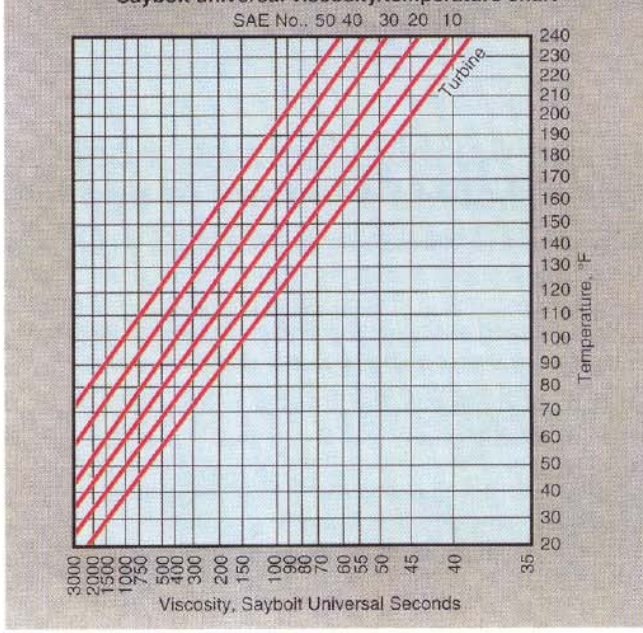
From curve 4, viscosity of SAE 10 oil at average oil temperature is 90 SSU. From curve 3, uncorrected pressure drop is 3.1 psi. From curve 5, correction factor is 2.0.

ΔP = 3.1 psi x 2.0 = 6.2 psi

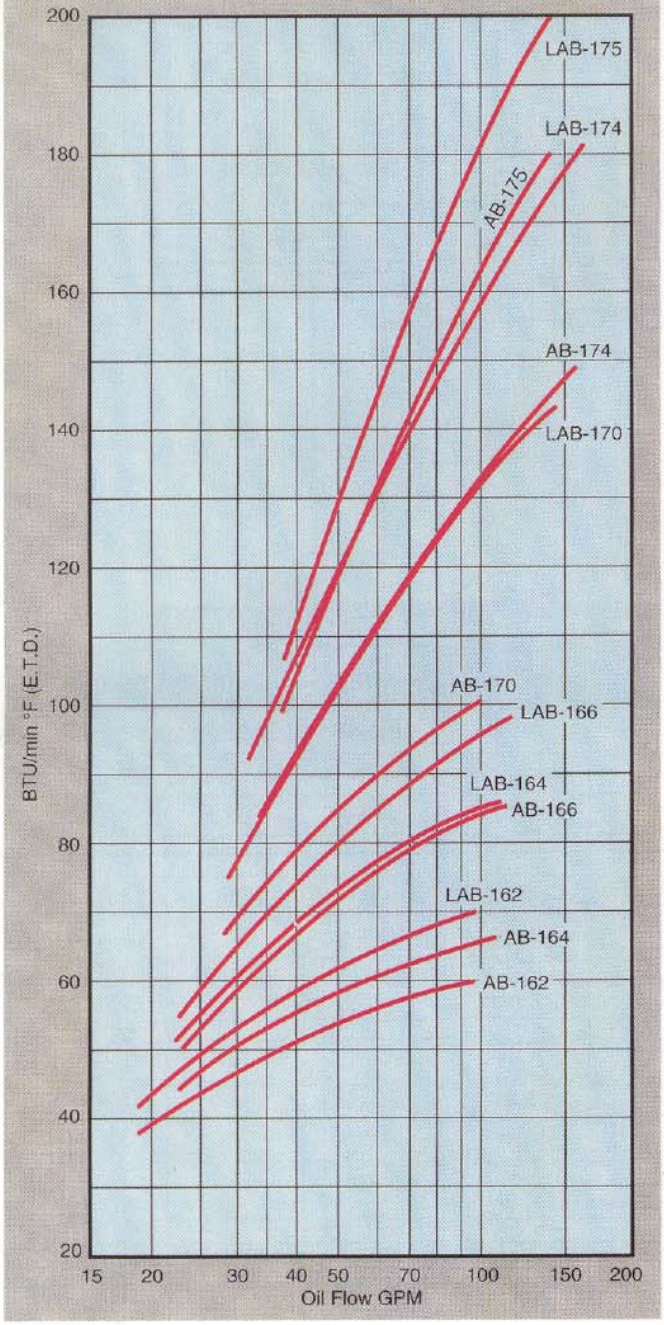
Curve 1
Cooling Capacity at 1ºF Entering Temperature Difference • Models AB-128-AB-132 & LAB-128-LAB-132



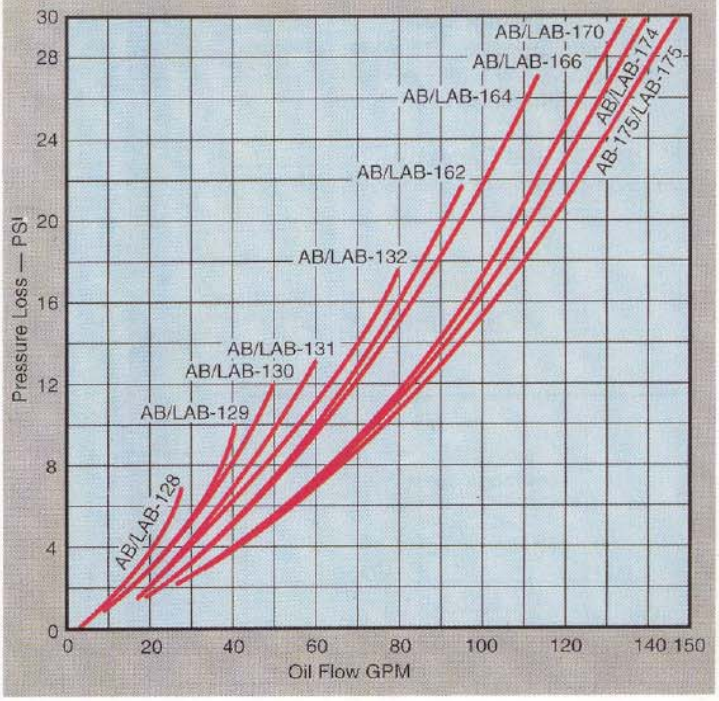
Curve 4
Viscosity/Temperature Reference
Saybolt universal viscosity/temperature chart



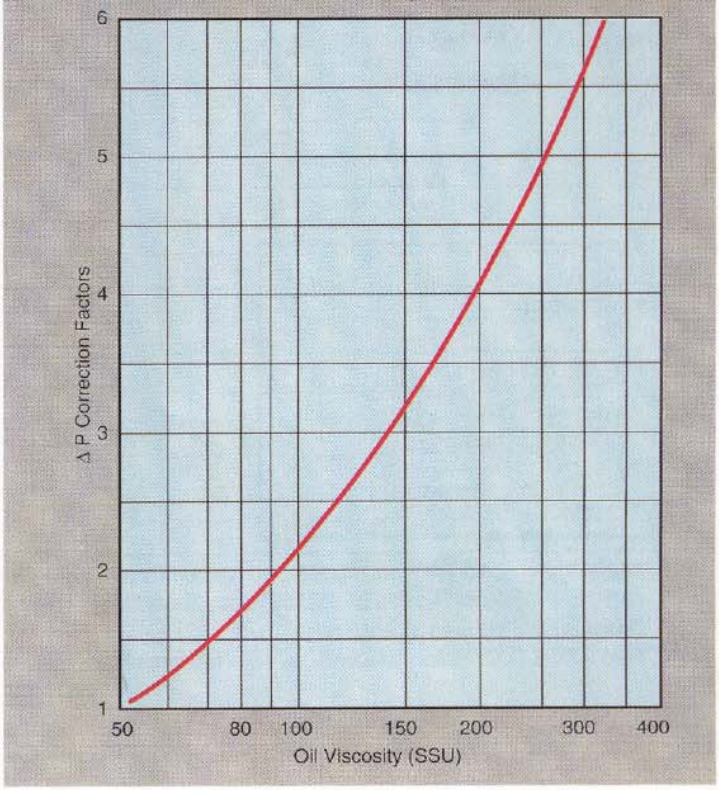
Curve 2
Cooling Capacity at 1°F Entering Temperature Difference • Models AB-162–AB-175 & LAB-162–LAB-175



Curve 3
Oil Pressure Drop • All Models
SAE-10 oil — average oil temp. 200°F (50 SSU)



Curve 5
Correction Factors, Viscosities



Metric conversions

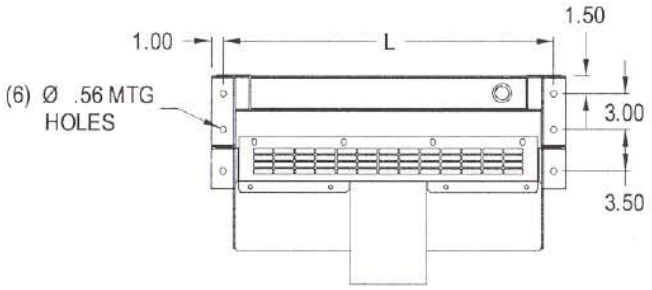
Liters	x .2642	= Gallons
Joules (mean)	x .0009486	= BTU's
°Celsius	x 1.8 + 32	= °Fahrenheit
Kilograms	x 2.2046	= Pounds
Meters	x 39.37	= Inches
Millimeters	x .03937	= Inches
Kilowatts	x 1.341	= Horsepower

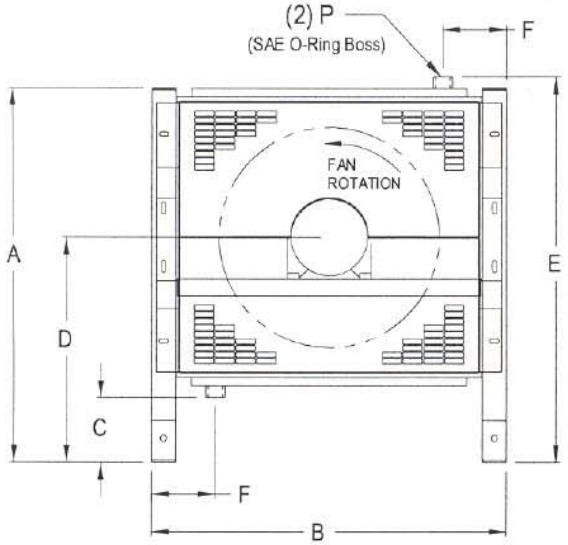
DIMENSION DATA

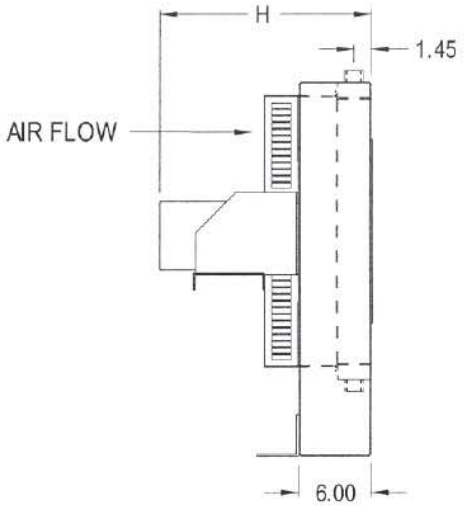
STYLE AB & LAB

MODELS 128 THRU 132

AB: Ruffled Fin
LAB: Louvered Fin







All dimensions are in inches.

Note: Dimensions are approximate. Consult Rocore for certified dimension drawings.

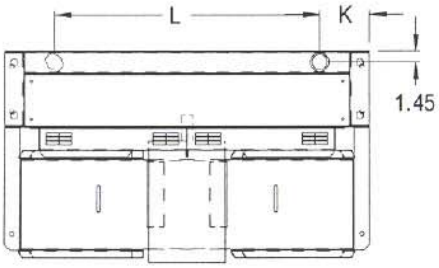
Model	AB/LAB 128	AB/LAB 129	AB/LAB 130	AB/LAB 131	AB/LAB 132
A	17.13	22.38	27.88	31.50	38.13
B	16.89	22.25	25.50	29.75	36.75
C	3.3	3.3	5.7	5.3	5.3
D	10.6	13.2	17.1	18.9	22.2
E	17.8	23.1	28.6	32.6	39.1
F	5.3	5.3	5.3	5.3	5.3
H (approx)	16.7	16.7	16.7	17.5	18.6
L	14.89	20.25	23.50	27.75	34.75
P (SAE O-Ring Boss)	1-5/16	1-5/16	1-5/16	1-5/8	1-5/8
Fan Dia. (in)	10	14	18	18	24
Fan Speed (rpm)	3450	1750	1750	1750	1750
Mtr. HP *	1/3	1/3	3/4	1	2
Oil Cap. (gal)	.31	.57	.75	1.01	1.53
Approx. Wt. (lb)	75	100	150	225	300

* Model 128 has 1/3 HP, single-phase, 60 hertz, 115 volt, totally enclosed motor.
All other models have three-phase, 60 hertz, 208/230/460 volt, totally enclosed, fan cooled motors.

** Optional NPT ports available.

*** Hydraulic & D.C. motors available on selected models.

Date 4/2/03
File Name AD0062.prt

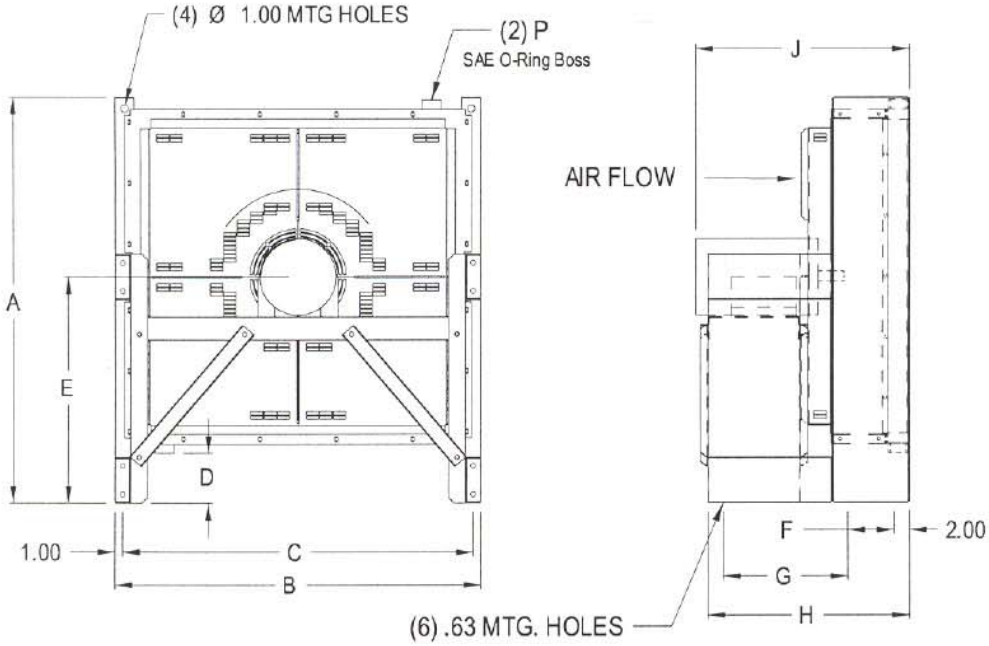


DIMENSION DATA

STYLE AB & LAB

MODELS 162 THRU 175

AB: Ruffled Fin
LAB: Louvered Fin



All dimensions are in inches.

Note: Dimensions are approximate. Consult Rocore for certified dimension drawings.

Model	AB/LAB 162	AB/LAB 164	AB/LAB 166	AB/LAB 170	AB/LAB 174	AB/LAB 175
A	45.13	49.75	53.25	60.13	70.69	78.63
B	41.34	45.62	47.78	58.50	66.00	74.58
C	39.34	43.62	45.78	56.50	64.00	72.58
D	6.6	6.6	6.6	6.6	6.6	6.6
E	25.6	27.9	29.7	33.1	38.4	42.4
F	6.00	6.00	6.00	6.00	14.0	14.00
G	10.00	10.00	16.00	16.00	16.88	16.88
H	21.06	21.06	26.19	26.19	34.63	34.63
J (approx)	23.1	23.1	27.8	27.8	37.3	40.3
K	6.50	6.50	6.50	6.50	6.50	6.50
L	28.34	32.62	34.78	45.50	53.00	61.58
P (SAE O-Ring Boss)	1-7/8	1-7/8	2-1/2	2-1/2	2-1/2	2-1/2
Fan Dia. (in)	30	30	36	42	48	60
Fan Speed (rpm)	1750	1750	1160	1160	1160	870
Mtr. HP *	3	3	5	5	7.5	7.5
Oil Cap. (gal)	1.96	2.41	2.71	3.79	5.02	6.35
Approx. Wt. (lb)	375	450	600	750	1000	1500

* All moters are three-phase, 60 hertz, 208/230/460 volt, totally enclosed, fan cooled motors.
** Optional NPT ports available.
*** Hydraulic & D.C. motors available on selected models.

Date 4/2/03
File Name AD0063.prt

cooling products

Marindustrial

Exclusive Authorized Distributor

Marindustriel (Div. Nadco)
Montréal QC H4T 1L7
Télé. : 514-342-2748
800-363-2259
Fax : 514-342-6151
Info-quebec@marind.ca

Marindustrial Ontario Inc.
Oakville ON L6H 5S3
Phone : 905-829-3004
800-866-3831
Fax : 905-829-4046

Marindustrial Inc.
Moncton NB E1H 3N4
Phone : 506-852-3332
800-463-3332
Fax : 506-857-8484